when there is found a difference in the length of the base lines above referred to. In healthy adults, Dr. Bryant found the normal length of this base line two and a half inches, and in cases of impacted fracture, it might be from one-half to one inch less.

The least reflection it seems to me ought to show that all this triangulation of the surgical region is attended with great uncertainty when performed by unskilful hands, and even with the greatest accuracy, the same person would not probably secure the same results upon two consecutive trials on account of the uncertainty of the "fixed points." No skill is required to fix the pelvis on the apparatus in hand, and the same results can be secured consecutively with very little care, as the rectangles formed are purely mechanical.

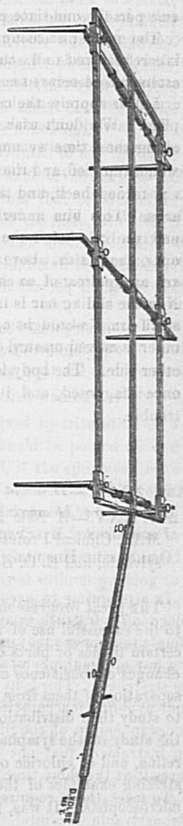
The careful admeasurement of a number of sound men with a view of testing the normal symmetry of the two sides resulted in showing the perfect accuracy of my rather crude apparatus. When the pelvis was placed in position, the sliding square showed no difference in the length of the limbs. This was a multiplied test for the instrument. On the other hand, the case of fractured femur, mentioned at the beginning of this paper, showed that the treatment had resulted in shortening of a little over one quarter of an inch, instead of one-half inch, as three different surgeons had concluded from the most accurate tape measurement. In conclusion, I would recommend surgeons who have occasion to use this kind of anthropometry, to prepare this rigid apparatus, and use it in preference to the tape measurements, made from badly defined anatomical points.

ART. XXIV.—*Description of an Apparatus devised by Dr. Thomas G. Morton for Measuring any Irregularity in the Length of the Lower Extremities.* By STACY B. COLLINS, M.D., Assistant Surgeon of the Orthopædic Hospital, Philadelphia. (With a wood-cut.)

IN attempting to accurately estimate the shortening which may take place after fracture, coxalgia, etc., it seems necessary to have—First, a simple instrument that can be used on a patient in bed without disturbing any applied apparatus. Second, to have it of material which cannot be stretched. Third, to have both limbs measured from one fixed point, thus avoiding inaccuracies resulting from obliquities of the pelvis, differences in height of the iliac bones, and similar causes. Fourth, to have an instrument that not only shows the inequality, but accurately measures it at the same time.

To meet these requirements, Dr. Morton, one of the surgeons of the Pennsylvania Hospital, introduced into that institution several years since an apparatus which, with some late improvements, I shall now describe.

It consists of two parts. First, a frame with movable arms, intended to hold the body and legs in exactly the same right line, or, in other words, to make the patient lie perfectly straight; and, secondly, a measuring rod extending from this which passes between the legs, and by means of two short arms touches the internal maleoli at exactly the same relative point at the same time on both sides. When this is done the measurement is accomplished, as a scale on the extended rod at once shows and records any existing difference. (See accompanying figure.)



The frame consists of three small steel bars, each three feet long, lying parallel to each other, and joined at the ends by means of two steel crossbars at right angles to the others, and nine inches long. This makes a rectangular frame nine inches by thirty-six inches, and divided into two equal parts by the third long bar running longitudinally.

From each side of this frame three arms extend, which, when it is in position on the person to be measured, drop perpendicularly, and by means of a right and left hand screw, held in position by the central bar, can be extended or contracted through brass boxes playing on the outside bars, so as to grasp the body firmly.

The boxes through which the arms run can be moved along the frame so as to clasp the person at any desired point, or in the case of children, allow all the arms to be moved toward one end, thus practically shortening the frame. It is evident that if this apparatus is laid on the body, and the arms screwed up so as to hold it tightly under the armpits, at the hips, and about the knees, any lateral motion is impossible, and the body is held immovably straight. This is necessary, because we have found from many experiments that the slightest deviation from the straight line at once produces an apparent shortening in the limb opposite to the side to which the body is bent. A hinged bar drops from the centre of the lower end of the frame, and extends between the legs. Over this runs another bar which can be pushed up or down as the length of the legs requires, and held in any desired position by means of a screw at the top. From either side of this outer bar extend short arms, which by means of an elbow with a long fenestra fitting on a steel button can be moved for a short distance up or down, a screw forming the top of the button allowing it to be fixed firmly at any spot, while small pointers, attached to the arms, and sliding up and down with them, run over a scale on the upper face of the outside bar, and show any existing shortening to the one-sixteenth of an inch.

The manner of using this apparatus is sufficiently simple, and when it is carefully made all sources of error (save possibly that from an actual attempt to deceive) seem to be eliminated.

Let us suppose the case of a patient lying in bed with extension applied. We don't wish to get him out of bed or disturb the apparatus, at the same time we are desirous of knowing whether we have sufficient weight applied, and the limb accurately adjusted in length. The clothes are turned back, and the frame is placed over him, so that one pair of arms clasps him under each axilla. The second pair firmly holds his pelvis a little below the iliac crests, while his legs are strongly pressed out on each side, above the knees, against the third pair of arms, which are approximated so as to allow about two inches between the ankles. Now the sliding bar is moved down a convenient distance, and one of the small arms is brought against the lower edge of one malleolus, and the other is moved upward or downward into a corresponding position on the other side. The body is now held immovable, any shortening can be at once diagnosed, and its amount read from the scale without further trouble.

ART. XXV.—*A New Method of Double Staining.* By W. F. NORRIS, M.D., Clinical Professor of Ophthalmology in the University of Pennsylvania, and E. O. SHAKESPEARE, A.M., M.D., of Philadelphia.

THE great progress made of late years in minute anatomy is largely due to the successful use of new reagents, which, having special affinities for certain tissues or parts of tissues, by their action upon them, produce such changes of consistence and of colour, as to give us an optical dissection or separation of them from surrounding tissues, and thus enable us minutely to study their distribution and structure. The uses of nitrate of silver in the study of the lymphatic system, of perosmic acid in the study of the retina, and of chloride of gold in the study of the nervous system, are striking examples of the above assertion, and are familiar to all practical microscopists. It was, therefore, with great interest, that during the past